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THE ALPINE BEARBERRIES AND THE GENERIC STATUS OF ARCTOUS.

M. L. FERNALD.

To those who are familiar with the flora of Canada it has long been known that there are two shrubs passing as *Arctostaphylos alpina*; one, the typical form of the species, with black or purplish-black pulpy strong-flavored berries; the other with more juicy and milder scarlet berries. Though not recorded in North America until 1852, the red-berried shrub was well described from Siberia as early as 1769. In his *Flora Sibirica*, J. G. Gmelin described the shrub from three districts, representing the full breadth of Siberia: "in the region of the Kutschakou mines among the Verkouturie chain" of the Ural Mountains (in northwestern Siberia near the Russian border); "on mountain barrens about the Olakminsk fortification" (on the Lena River northeast of Lake Baikal); and "in the hills of Ochotsk at the mouth of the Marecan River." These plants were listed as *Arbutus caulis procumbens, foliis rugosis serratis* of Linnaeus's *Flora Lapponica*, which is the black-berried *Arctostaphylos alpina*; but in his description Gmelin said that the berries are "red . . . with abundance of juice and an insipid taste."¹ The first record of the scarlet-fruited shrub in North America was apparently by Sir John Richardson, who, in the enumeration of the trees and shrubs of British America, wrote of the Alpine Bearberry, *Arctostaphylos alpina* (L.) Spreng. (*Arbutus alpina* L.): "there are two varieties, one

¹ "In regionem Kutschakouensis fodinae intra catanem montium Verchoturenium et in sterilibus montasis intra Olecmense munimentum, vt et Ochotii ad Marecani fluii ostium in collibus occurrit. Baccas magnas habet, rubras, . . . succi plenas, gustuque fatuas." — J. G. Gmel., Fl. Sib. iv. 119 (1769).

with bright red and more juicy fruit; the other, having a dark purplish-black berry, of more fleshy consistence, and a stronger peculiar flavor. Both are eaten in the autumn; and, though not equal to some of the other native fruits, are not unpleasant. The two kinds are exactly alike in foliage."¹ In 1884, Professor John Macoun wrote: "Both Hooker and Gray state that the berries of this species are black, on the contrary, those on specimens obtained on Anticosti and the Rocky Mountains [of Canada] are bright red."² In 1901, Britton & Rydberg, in an enumeration of plants from Yukon, after listing specimens (as *Mairania alpina*) add: "The red-fruited form collected also by Tarleton below Selwyn River";³ in 1902, Miss Eastwood, enumerating the plants of Nome City, Alaska, described the material as having "leaves thin, deciduous, . . . surface smooth . . . fruit a red, juicy berry"⁴ and added the comment: "The berries which were collected and preserved in formalin may not be ripe. According to the descriptions they are black when ripe"; in 1907, Miss Farr, in her *Catalogue of the Flora of the Canadian Rocky Mountains and the Selkirk Range*, after listing stations at Banff, on Mt. Sulphur, at Field and in the Yoho Valley, said: "The drupes are a bright, clear red in color";⁵ and in the same year Mr. Stewardson Brown, in his *Alpine Flora of the Canadian Rocky Mountains*, describes the shrub (as *Mairania alpina*) as having "leaves thin . . . berry bright scarlet."⁶

But through all this period the scarlet-fruited plant, treated merely as a color-form of the polar *Arctostaphylos alpina*, received no name. Very recently, however, in the enumeration of woody plants from western China, *Plantae Wilsonianae*, Rehder & Wilson have set off the shrub as *Arctous alpina*, var. *rubra*,⁷ distinguished in the diagnosis merely by its red fruit, but with a supplementary note that "the leaves of the red fruited variety, both in the Asiatic and American specimens, are thinner and larger, while those of the typical form are smaller and of firmer texture."⁸ The specimens cited by them are the

¹ Richardson, Arctic Searching Expedition, 433 (1852).

² Macoun, Cat. i, 294 (1884).

³ Britton & Rydberg, Bull. N. Y. Bot. Gard. ii, 179 (1901).

⁴ Eastwood, Bot. Gaz. xxxiii, 209 (1902).

⁵ Farr, Contrib. Bot. Lab. Univ. Pa. iii, No. 1, 61 (1907).

⁶ S. Brown, Alp. Fl. Can. Rocky Mts. 214, 215 (1907).

Rehder & Wilson treat the name *Arctous* as masculine but Niedenzu, who first took up the name (originally coined without explanation of its origin by Gray for a section of *Arctostaphylos*) for the genus, treated it as feminine, and it seems proper in such a case to follow the decision of Niedenzu.

⁸ Rehder & Wilson, Pl. Wils. pt. iii, 556, 557 (1913).

type, Wilson no. 4025 from western Szech'uan in China, and two of Rehder's collection from near Banff and near Laggan, Alberta; but three of the above references to red berries in America (including Macoun's note on the Anticosti shrub) are given and the conclusion drawn that, "It seems to be the common form of western North America" and "The plant of eastern North America has bluish black fruit like that of Europe." The record from Anticosti clearly indicates, however, that the shrub is not strictly of "western North America" but occurs also near the easternmost margin of the continent; and in studying the plant as a member of the flora of eastern America the writer has found that, besides the characters indicated by Rehder & Wilson, the scarlet-berried shrub has several others which are of greater import and mark it as a well-defined second species of the section *Arctous*, a group of *Arctostaphylos* heretofore considered monotypic.

Briefly, the differences between *Arctostaphylos alpina* and the scarlet-berried plant are as follows. In *A. alpina* the persistent inner scales of the winter-buds are obovate and rounded at summit; in the scarlet-berried plant ovate or lanceolate and acuminate: in *A. alpina* the leaves are very rugose, subcoriaceous and marcescent, their margins, especially toward the base and on the petioles, ciliate with stiff bristles 1–2 mm. long; in the other shrub the leaves are less rugose, thinner, and more or less definitely deciduous, their margins without definite cilia, the usually longer petioles glabrous or at most minutely pilose-ciliolate at base: in the black-berried plant the seeds are 2.7–4.6 mm. long, 2–3.6 mm. wide; in the red 2.5–3 mm. long, 1.6–2.2 mm. wide: the black-fruited shrub is, in America at least, primarily if not always a shrub of acid or noncalcareous rocks; the red-fruited both with us as well as in China a plant of limestones.

That *Arctostaphylos alpina* in eastern America is a shrub of acid or noncalcareous habitats is well-known to those whose explorations have extended from New England to Labrador. The specimens and records of exact stations in eastern America, west of Greenland, make this apparent: Cape Prince of Wales, Hudson Straits, "where the rocks were found to be chiefly coarse, red granitite-gneiss";¹ Cape Chidley or Chudleigh, where "the rock everywhere consists of ordinary varieties of gneiss";² Nachvak, Labrador, where the "mountains . . .

¹ Low, Geol. Surv. Can., Ann. Rep. n. s. xi. 372 (1899).

² R. Bell, Geol. and Nat. Hist. Surv. Can. Rep. of Progr. for 1882-'84, 18 DD (1885).

proved to be mostly Laurentian gneiss";¹ Hopedale, Labrador, its rock "of the ordinary Laurentian gneiss . . . with veins of quartz and of granite";² Indian Harbor, Labrador, with "hills . . . formed of a pale whitish foliated syenite";³ Battle Harbor, Labrador;⁴ L'Anse au Loup and Blanc Sablon, Labrador, with their lowlands of Laurentian gneiss;⁵ Barred Island and Baccalieu Island and Twillingate, Newfoundland;⁶ open granite crests, Mt. Steepmore, Newfoundland; open granitic ledges, Mt. Musgrave, Newfoundland; Laurentian uplands back of Balena, Newfoundland; crests of Huronian hills, Miquelon; La Tabatière and Mécatina, Saguenay Co., Quebec, in the gneissoid region of the "North Shore";⁷ crests of hornblende schist, Flagstaff Peak, Mt. Albert, Quebec; Traveller Mt., Maine, "composed of a beautiful drab colored siliceous slate";⁸ Mt. Katahdin, Maine; and the White Mts., New Hampshire.

The preference for calcareous soils of the scarlet-berried plant is clearly indicated also by the Canadian stations from which it is definitely known: Anticosti Island, composed of Silurian rocks, chiefly limestones;⁹ Fort Churchill, Hudson Bay, with its areas of Silurian and Cambro-Silurian limestones;¹⁰ Jasper House, Alberta, at the base of a conspicuous limestone mountain;¹¹ Bow River Pass (including Banff, Sulphur Mt., and Laggan), Alberta, where "The rocks composing the mountains on both sides of the valley are almost entirely of the limestone series";¹² Kicking Horse Pass (including Field), British Columbia, with "rocks referred to the great limestone series coming down to the level of the bottom of the valley";¹³ Yoho Valley (North Fork, Cross River), British Columbia, where "the limestones, both in the bottom of the valley and so far as could be

¹ R. Bell, I. c. 14 D D (1885).

² Packard, Lab. Coast, 206 (1891).

³ Packard, I. c. 171 (1891).

⁴ "We pass Outer Battle Island and the 'Two Sisters,' bare, low islands of nearly white gneiss." — Packard, I. c. 137 (1891).

⁵ See Packard, I. c. 116-118 (1891); also Fernald, RHODORA, xiii. 121 (1911).

⁶ All in the sandstone, diorite and serpentine region of Notre Dame Bay (See Howley's geological map).

⁷ See Logan, Can. Geol. 287 (1863).

⁸ C. H. Hitchcock, Prelim. Rep. Nat. Hist. and Geol. Me. for 1861, 403.

⁹ See Logan, Geol. Can. Chaps. x and xii.

¹⁰ See Tyrrell, Geol. Surv. Can., Ann. Rep., n. s., ix. 167, 168 F (1897).

¹¹ "Roche Miette, a notable landmark . . . stands on the east side of the Athabasca a few miles below Jasper Lake" and is composed chiefly of limestone — See McEvoy, Geol. Surv. Can., Ann. Rep., n. s. xi. 29D and Pl. 1 (1900).

¹² G. M. Dawson, Geol. Surv. Can., Ann. Rep., n. s., i. 134 B (1886).

¹³ Dawson, I. c. 139B (1886).

observed, to the tops of the adjacent mountains, have become changed to marble";¹ below Selwyn River, Yukon;² Cape Nome, Alaska.³ Of the three Siberian stations of Gmelin two are definitely located on a geological map of Siberia, Olakminisk and Ochotsk, both in "Paleozoic" areas; and, most important of all, the type station in western China is "by the side of a stream rich in calcareous deposits."⁴

Differing from the black-berried shrub in such essential characters:—the narrower and pointed inner scales of the winter-buds, the thinner and more elongate, more deciduous leaves without the characteristic bristly ciliation, the juicier scarlet berries and the smaller seeds, as well as its usual if not absolute restriction to calcareous soils; the scarlet-berried shrub has abundant claims to specific separation. Before formally transferring it, however, it is necessary to look into the generic name which it should bear. Its black-fruited relative of Eurasia and our northern and alpine granitic, gneissoid and siliceous areas was called by Linnaeus *Arbutus alpina*, but by practically all subsequent botanists has been treated as generically distinct from *Arbutus*, which has a many-seeded berry.

The generic name *Arctostaphylos* Adanson (1763), though very inadequately defined, has been almost universally used for *A. alpina* (L.) Spreng. (1825) and for *A. Uva-ursi* (L.) Spreng. and its allies, but recently Mr. F. N. Williams⁵ has revived the Clusian and Tournefortian *Uva Ursi* on the basis of its post-Linnean use by Miller in the Abridgement of the Gardener's Dictionary in 1754, nine years before the publication of the generic name *Arctostaphylos*. The name or names, *Uva Ursi*, altered by Mr. Williams to *Uva-ursi* and by some others to *Uva-Ursi* has promptly been taken up by several authors to displace *Arctostaphylos*; but as Mr. B. Daydon Jackson well points out: "The proposed use of *Uva Ursi* for *Arctostaphylos* is excluded by analogy: Linnaeus (Phil. Bot. 160 (1751)) says:—'Nomina generica ex duobus vocabulis integris ac distinctis facta, e Republica Botanica releganda sunt....[e. g.] Vitis idaea T. *Vaccinium*.'"⁶ Not only is the name *Uva Ursi* excluded by analogy and

¹ Dawson, l. c. 116B (1886).

² The writer has been unable to learn with definiteness the rock at this station.

³ On the latest geological map of North America much of the Seward Peninsula, including Nome, is indicated as Paleozoic.

⁴ Rehder & Wilson, l. c.

⁵ F. N. Williams, Journ. Bot. xlviii. 183 (1910).

⁶ Jackson, ibid. 206 (1910).

by the consistent practice of the "Botanical Republic," but the International Rules specifically cover the case in Article 54. "Names of genera must be rejected in the following special cases: . . . 3. When they are formed of two words, unless these two words were from the first united or joined by a hyphen." Miller, and before him Tournefort and Clusius, neither joined the two words by a hyphen nor united them into a single word but wrote with absolute clearness: *Uva Ursi*. The name *Arctostaphylos* will, then, continue to be used by those who follow the International Rules.

The taking up of the two unhyphenated words *Uva Ursi*, altered to a compound word *Uva-Ursi*, as has been done by some advocates of the "American" Code, seems to be in violation of the rule in that Code which says: "The original orthography of names is to be maintained, except in the following cases; . . . (a) Manifest typographical errors may be corrected. (b) Adjectival names of species and subspecies agree in gender with the generic name with which they are associated. (c) Generic names derived from personal names should be feminine, . . . (d) In the cases of names proposed in works in which *v* and *j* were used as vowels or *u* and *i* as consonants they should be corrected to agree with modern usage." If this rule is really to be followed by its advocates it is difficult to see how such an altered generic name as "*Uva-Ursi*" is allowable when the "original orthography" of Miller, and Tournefort before him, and Clusius before him, was uniformly the two words *Uva Ursi* or Bear's Grape.

Of late several botanists have been treating the Alpine Bearberry as belonging to a monotypic genus under the name *Mairania* Necker, *Elem. Bot.* i. 219 (1790), but, as Rehder & Wilson (*l. c.*) point out, *Mairania* was purely synonymous with *Uva Ursi* Tournefort and by neither Necker nor Desvaux, who took up the name, was used to distinguish the Alpine Bearberry as such. The type of *Mairania* is *Arctostaphylos Uva-ursi* (L.) Spreng. as is clearly shown by Necker's statement: "Quaed. Arbut. Linn. *Uva ursi* *Tournef.*" Necker was simply reinstating Tournefort's *Uva Ursi* as a genus under a monomial generic name and separating it from *Arbutus* with which Linnaeus had merged it, saying: "Hanc cum praecedente [Arbuto], confudit Linnaeus: utramque, meritò separavit Tournefortius, siquidem characterem diversum, monstrant tam fructa quam numero seminum." Britton, in the 2d edition of the *Illustrated Flora*, keeps up *Mairania* for the Alpine Bearberry, ascribing it to Necker but dating it not from

Necker's own publication, as was done in the previous edition, but from Desvaux's *Journal de Botanique*, iii. 36, 292 (1813); but surely Desvaux's treatment gives no ground for generically separating *Arbutus* or *Arctostaphylos alpina* from *A. Uva-ursi*. In fact, it requires a far keener scent for nomenclatorial trails than the present writer possesses to follow Desvaux to any rational conclusion. Here is what Desvaux did. In the body of the volume he wrote:

"[p. 36] MAIRANIA ARCTOSTAPHYLOS, Adanson.

Calix minimus 5 partitus; corolla ovata, limbo parvo, 5 [p. 37, line 1] fido revoluto. Stamina, 10 inclusa; filamenta glabra, an- [line 2] therae longitudinaliter dehiscentes, et apicè non biperforatae; [line 3] bacca, 5 locularis, loculis monospermis. Sufrutices folia [line 4] alterna, flores axillares subracemosi.

[line 5] ARBUTUS, L.

[line 6] Calix minimus 5 partitus; corolla ovata, limbo parvo, 5 [line 7] fido revoluto, Stamina, 10 inclusa, filamenta villosa; an- [line 8] therae poro gemino apicè dehiscentes. Bacca 5 locularis, lo- [line 9] culis polyspermis. Frutices; foli alternans flores terminales [line 10] subracemosi.

[line 11] 1. ALPINA, Desv. *Arbutus alpina*, L. Foliis rugosis ser-[line 12] ratis. Habitat in alpibus et pyrenaeis.

[line 13] 2. UVA URSSI, Desv. *Arbutus uva ursi*, L. Foliis interrimis. [line 14] Habitat cum priore."

It is certainly evident that the two species, *Arbutus alpina* L. and *A. Uva-ursi* L., were here put under *Arbutus*, not *Mairania*; but, needless to say, by their real characters they both belong under Desvaux's definition of "MAIRANIA ARCTOSTAPHYLOS" with "bacca, 5 locularis, loculis monospermis."

In the Errata, on page 292, Desvaux attempted some sort of a disentanglement, saying:

"Page 36, avant-dernière ligne, lisez ARBUTUS, L.

— 37, ligne 5 ARBUTUS, Lin., lisez MAIRANIA, Neck. *Arctostaphylos*, Adans.

— *Id.* ligne 11, lisez MAIRANIA ALPINA.

— *Id.* ligne 12 [should have been 13], lisez MAIRANIA UVA URSSI."

But this simply made a bad matter worse, for, after making the correction, we get the many-seeded *Arbutus* described as having "Bacca, 5 locularis, loculis monospermis," and the genus *Mairania* or *Arctostaphylos*, with its characteristic drupe with few nutlets, described "Bacca 5 locularis, loculis polyspermis"; and under this mangled generic description we get two species: "1. MAIRANIA ALPINA, Desv. *Arbutus alpina*, L." with its few nutlets, and "2. M. UVA URSSI, Desv.

Arbutus uva ursi L." which commonly has its few nutlets fused into 1 stone. This publication of Desvaux's was obviously a hopeless piece of blundering, but, even if one can infer what he might have said if he had written otherwise, there is nothing in it to indicate the slightest tendency to separate *Mairania* from *Arctostaphylos* Adans. nor to treat *Mairania* or *Arctostaphylos alpina* as belonging to a separate genus from *M.* or *A. Uva-ursi*.

But even if the chance (i. e. alphabetical) placing of *M. alpina* before *M. Uva-ursi* in Desvaux's ill-begotten enumeration of the two can possibly mean to followers of the "American" Code that Desvaux was thus setting up a genus *Mairania* including the Alpine Bearberry as opposed to the common lowland Bearberry, it is impossible to see how the "American" Code allows *Mairania* to be taken up in this sense on the basis of Desvaux's publication in 1813 when the name had already been used by Necker in 1790 for *Uva Ursi* of Tournefort; for there can be no question that Tournefort's *Uva Ursi* was the common Bearberry. Tournefort clearly indicated this when he wrote: "I know one species of *Uva Ursi* (*Uvae Ursi speciem unicam novi*)," and when he illustrated the fruit with 5 coherent nutlets.¹

Rehder & Wilson follow Niedenzu, in Engler, Bot. Jahrb. xi. 180 (1889), in using for the Alpine Bearberry the name *Arctous* which was the name given by Gray (*Synoptical Flora*) to a section including *Arctostaphylos alpina* as contrasted with the other species. If the genus *Arctous* is to be maintained it should be under that name; but its claims to generic rank seem to the writer, as they have to many others, extremely trivial and such as even the most extreme devotees of change have not yet ventured to apply to parallel cases in many other genera, such as *Vaccinium*, *Ilex* and *Rubus*. The fullest definitions of *Arctous* (*Mairania* Britton, not Necker) as opposed to *Arctostaphylos* ("*Uva-Ursi*") seem to be those of Drude in Engler's *Pflanzenfamilien* and of Britton in Britton & Brown's *Illustrated Flora*; and, since these emphasize essentially the same points, the English descriptions are here quoted.

ARCTOSTAPHYLOS. "Erect or spreading, low or tall shrubs (some western species small trees). Leaves alternate, petioled, firm or coriaceous, persistent, evergreen. Flowers small, nodding, pedicelled, white or pink, in terminal racemes, panicles or clusters. Clayx 4-5-parted, persistent. Corolla globose, ovoid, urceolate or oblong-campanulate, 4-5-lobed, the lobes recurved, im-

¹ See Tourn. Inst. 598, t. 370 (1700).

briated in the bud. Stamens 10, rarely 8, included; filaments short, subulate; anthers short, erect, introrse, with 2 recurved awns on the back, the sacs opening by a terminal pore. Disk 8-10-lobed. Ovary 4-10-celled; ovules solitary in the cavities; style slender. Fruit a drupe, with 4-10 seed-like nutlets coherent into a solid stone.”

ARCTOUS (“*MAIRANIA*”) . . . “A low shrub, with shreddy bark, alternate thin deciduous leaves clustered toward the ends of the branches, and small white clustered pedicelled flowers. Calyx 4-5-parted. Corolla 4-5-toothed, the short teeth spreading or recurved. Stamens 8 or 10, included; anther-sacs with 2 recurved dorsal awns. Ovary 4-5-celled; ovules 1 in each cavity. Drupe globose, with 4 or 5 separate 1-seeded nutlets.”¹

The description of *Arctous* (“*Mairania*”) is briefer than the other, but it seems to contain only these strongly contrasting or by inference opposing characters: *Arctous* “with shreddy bark, . . . thin deciduous leaves” as opposed to *Arctostaphylos* with character of bark not stated, leaves “petioled, firm or coriaceous, persistent, evergreen”; and *Arctous* with nutlets separate as opposed to *Arctostaphylos* “with 4-10 seed-like nutlets coherent into a solid stone.” The key states these points concisely:

“Nutlets coalescent; leaves persistent.
Nutlets separate; leaves deciduous.

19. *Arctostaphylos*²
20. *Mairania*.³

Some others, Drude² for instance, add to these characters the juicier pulp of *Arctous* as contrasted with the more mealy pulp of *Arctostaphylos*. Niedenzu,³ on the other hand, bases his “generic” distinction chiefly on the anatomical structure of the leaves, *Arctostaphylos Uva-ursi* and others (with the exception of *A. glauca* which is allowed to remain in *Arctostaphylos*) having a more or less dense coat of pubescence on the leaves (“Deckhaare vorhanden”), *Arctous* having glabrous leaves (“Deckhaare fehlen”), etc.

If all these contrasting characters, ascribed by one person or another to *Arctous* as opposed to *Arctostaphylos*, would only exhibit themselves in nature as they do on paper the genus *Arctous* would have much to commend it; but unfortunately not one of the weightier characters stands three minutes’ test in a representative herbarium. The shreddy bark, for example, of the trailing branches of *Arctostaphylos* (or *Arctous*) *alpina* is so like that of *Arctostaphylos Uva-ursi* that only after long practice could the two be distinguished by the bark.

¹ Britton in Britton & Brown, Ill. Fl. ii. 572 (1897).

² Drude in Engler & Prantl, Pflanzenf. iv. Ab. 1, 49 (1889).

³ Niedenzu in Engler, Bot. Jahrb. xi. 178, 179 (1890).

In some way the statement has become a fixture in many of the American and European descriptions, that the leaves of *Arctostaphylos* (or *Arctous*) *alpina* are "thin and deciduous." But surely such a statement would never knowingly be made by anyone who, like the writer, has many times tramped over miles of barrens carpeted with the Alpine Bearberry and has eaten quarts of its bitter-sweet berries in the hope of growing to like them. *Arctostaphylos* or *Arctous alpina* certainly *does not* have deciduous leaves! On the contrary they are marcescent, losing their freshness during the winter and persisting, often for many years, as masses of bleached and alternately dry and wet foliage. So persistent are these old leaves, that in collecting the shrub for the herbarium it is necessary to tear off a large proportion of the old foliage in order to display the branches and the newer shoots. That the spick-and-span branches artificially depleted of all old leaves, such as one often finds in the herbarium, should lead to an impression that the leaves are deciduous is not unnatural, but this *post mortem* and wholly artificial character cannot be maintained as generically separating *Arctous* from *Arctostaphylos*.

This observation, that the leaves of *Arctostaphylos* or *Arctous alpina* are marcescent, not deciduous, is abundantly verified by the statements of others who have an intimate acquaintance with the growing shrub. Thus we find in Koch's *Synopsis*: "foliis...glabris, basi integerrimis ciliatisque marcescentibus";¹ in Ledebour's *Flora Rossica*: "foliis...glabris basi integerrimis subciliatis marcescentibus";² while Blytt in his *Norges Flora* goes into more detail: "the leaves wither in winter and remain withered during the next summer (Bladene visne om Vinteren og sidde visnede igjen næste Sommer)."³

In the somewhat less coriaceous or even membranous leaves *Arctostaphylos* or *Arctous alpina* certainly differs from all the other members of the group, except the red-berried plant described as *Arctous alpina*, var. *rubra*, and in their glabrous leaf-surfaces these two differ from all other species of the group except *Arctostaphylos glauca*; but the texture and degree of pubescence of leaves surely cannot alone differentiate a genus.

The other really strong character (on paper) is the statement that in *Arctostaphylos* we have "4-10 seed-like nutlets coherent into a

¹Koch, *Syn.* ed. 3, pt. 1, 412 (1857).

²Ledeb. *Fl. Ross.* ii. 908 (1844-46).

³Blytt, *Norg. Fl.* i. 839 (1861).

solid stone," while in *Arctous* there are "4 or 5 separate 1-seeded nutlets." This statement in regard to *Arctous* is unquestioned; but what are the demonstrated facts in regard to *Arctostaphylos*? In *Arctostaphylos Uva-ursi* the nutlets are commonly more or less fused, but anyone who will take the trouble to examine the ripe fruits of a large series of specimens can see for himself that on occasional plants there are fruits which, when pressed between the thumb and first finger or under the thumb-nail, quickly crush into 5 distinct nutlets! If he is keenly enough interested to examine other species, for example *A. pungens* HBK., one of the commonest of Manzanitas, he will have the same experience. In both these common plants and in many other species of *Arctostaphylos* he can find fruits with all the nutlets coherent, with some of them coherent and others free, or with all of them distinct. This again is not merely the writer's observation: it belongs to that common store of knowledge which a very slight study of the literature of the group (to say nothing of the specimens) quickly brings into prominence. Thus, in the *Botany of California* the section including most of the Manzanitas is described: "the stones commonly separate or separable, at least some of them, not rarely some of them united or 2-celled and 2-seeded";¹ in the *Synoptical Flora of North America* the section *Uva-ursi*, containing *Arctostaphylos Uva-ursi*, *tomentosa*, *pungens*, etc., is said to have "its nutlets separate or separable, or irregularly coalescent."² Jepson, dealing only with the Manzanitas (true *Arctostaphylos*) says: "Nutlets distinct, irregularly united in 2s or 3s, or sometimes consolidated into a single stone,"³ and Abrams, dealing with the Manzanitas of southern California, says: "Ovules solitary in the cells, which become bony nutlets or combine into a few-several-celled stone,"⁴ and describes *Arctostaphylos Manzanita* with "nutlets irregularly separable," *A. tomentosa* with "nutlets all separate or some united in pairs," and *A. Pringlei* with "nutlets consolidated into a rough carinate stone, or separable." The maintenance of *Arctous*, then, because its nutlets are separate, as opposed to *Arctostaphylos* with nutlets coalescent, is as artificial as its maintenance because of "deciduous" leaves.

There remains the one absolute fact, that in *Arctostaphylos* the pulp

¹ Gray in Brewer & Watson, Bot. Cal. i. 452 (1876).

² Gray, Syn. Fl. ii, pt. 1, 27 (1886).

³ Jepson, Fl. W. and Mid. Cal. ed. 2, 312 (1911).

⁴ Abrams, Fl. Los Angeles and Vic. 291 (1904).

of the fruit is dryish and unpalatable, in *Arctous* juicier and to some people not wholly unpalatable; but, according to Richardson, *Arctostaphylos alpina* has the "dark purplish-black berry of more fleshy consistence, and a stronger peculiar flavor" than the "one with bright red and more juicy fruit" (*Arctous alpina*, var. *rubra*). Surely, if *Arctous alpina* can be generically separated from *Arctostaphylos* by its "deciduous" leaves, its distinct nutlets, and its juicier pulp, the scarlet-berried shrub, with thinner and nonciliate leaves sometimes really deciduous, and with still more juicy fruit, has just as strong claims to generic separation from the black-berried *A. alpina* with marcescent thickish and more rugose ciliate leaves, and fruit "of more fleshy consistence."

From this analysis of the frail characters pushed to the front by those who urge the generic separation of *Arctous* (*Mairania* of Britton, not Necker) it is apparent that they are not only trivial but largely nonexistent, and that no sound reason has yet been advanced for the separation of the section *Arctous* as a genus.

The scarlet-berried shrub, which led to this exposition of a typical case of the elevation to generic rank of long-known and already closely studied sections and subgenera, the sort of hasty change that some people consider "progressive," may be called, then, by the scarcely distinctive name

ARCTOSTAPHYLOS **rubra** (Rehder & Wilson) n. comb., rami prostrati, cortice brunneo in lamellas secedente, ramulis adscendentibus; bracteis interioribus persistentibus gemmarum lanceolatis vel ovatis acuminatis; foliis membranaceis deciduis vel paullo marcescentibus planis vel rugosis glabris, laminis oblanceolatis vel cuneato-ovatis 1.3–4.5 cm. longis 0.6–1.6 cm. latis erenatis ciliatis basi integris apice obtusis vel acutis, petiolis pallidis 0.5–1.5 cm. longis glabris vel minute piloso-ciliolatis; baccis coccineis vel rubris succulentis, seminibus 5 distinctis 2.5–3 mm. longis, 1.6–2.2 mm. latis.

Stems prostrate, covered with a loose brown bark exfoliating in thin layers; branchlets ascending: inner persistent bracts of the buds lanceolate or ovate, acuminate: leaves membranaceous, deciduous or slightly marcescent, flat or rugose, glabrous; the blades oblanceolate or cuneate-ovate, 1.3–4.5 cm. long, 0.6–1.6 cm. wide, crenate, not ciliate, entire at base, the apex obtuse or acute; petioles pale, 0.5–1.5 cm. long, glabrous or minutely pilose-ciliolate: berries scarlet or red, succulent; seeds 5, distinct, 2.5–3 mm. long, 1.6–2.2 mm. wide.—*Arbutus caulinis procumbentibus, foliis rugosis serratis*, J. G. Gmelin, Fl. Sib. iv. 119 (1769), not L. Fl. Lapp. *Arctostaphylos alpina* (red-fruited variety or form) Richardson, Arct. Search. Exped. 433 (1852);

Macoun, Cat. Can. Pl. i. 294 (1884); Eastwood, Bot. Gaz. xxxiii. 209 (1902); Farr. Contrib. Bot. Lab. Univ. Pa. iii. No. 1, 61 (1907). *Mairania alpina* (red-fruited form) Britton & Rydberg, Bull. N. Y. Bot. Gard. ii. 179 (1901); S. Brown, Alp. Fl. Can. Rocky Mts., 214 (1907). *Arctous alpinus* [a], var. *ruber* [ra] Rehder & Wilson, Pl. Wils. pt. iii. 556 (1913).—Calcareous soils, Siberia and western China; in North America known from Alaska, Yukon, British Columbia, Alberta, Keewatin, and Quebec (Anticosti Island). For citation of stations see pages 21, 22, 24 and 25.

GRAY HERBARIUM.

SYSTEMATIC STUDIES ON OENOTHERA,— IV. OE. FRANCISCANA AND OE. VENUSTA, spp. NOVV.

HARLEY HARRIS BARTLETT.

(Plates 107 and 108.)

THE allies of *Oenothera Hookeri* form an especially difficult group from a systematic standpoint. In as much as they are open-pollinated forms and range throughout most of the far West from Oregon and Washington to Mexico, the chances are great that numerous spontaneous hybrids exist. Although the writer has had a number of forms related to *Oe. Hookeri* in cultivation during the last three years, it has been very difficult to arrive at any conclusion in regard to specific lines in the group. Aside from the more narrow-leaved forms one of which probably represents the true *Oe. Hookeri* T. & G., the cultures have included two very satisfactorily distinct new species, which can be safely characterized at this time. One of them, *Oe. franciscana*, has been cultivated by the writer through three generations. The seeds were taken from a packet accompanying a herbarium specimen which was collected July 30, 1905, at Carmel Beach, Monterey County, California, by Prof. C. P. Smith, of the Maryland Agricultural College, (C. P. Smith 1063, in herb. Bartlett.) They were planted in the open in the spring of 1910. Since the species is rather persistently biennial unless the seeds are started during the winter in the greenhouse, the plants failed to mature during the first season. One plant, however, bore in the axil of a rosette leaf, a single precocious flowering branch

from which seeds were obtained for a small culture (10 plants) which was started early enough so that it flowered normally during the summer of 1911. The culture of 1910, from the wild seeds, also flowered in 1911 and was identical with the F_1 generation. The same plant, which had flowered precociously in 1910, flowered again in 1911, and was self-pollinated. From the self-pollinated seeds of this plant a second F_1 of ten plants was grown in 1912. One of them, No. 6₁₀-6₁₂ in the writer's garden at Bethesda, Maryland, served as one parent of reciprocal crosses of which the other parent was a plant of true *Oe. biennis* L. in the garden of Prof. B. M. Davis at the University of Pennsylvania. The same parent plant, which was used for the crosses, was self-pollinated to continue the pure strain. In 1913, fifty plants were brought to maturity in the garden of the Bureau of Plant Industry at Glenn Dale, Maryland, and Davis grew the hybrids with *Oe. biennis*, as well as a considerable number of plants of the pure strain, at Philadelphia. Prof. Davis also had a culture of *Oe. franciscana* from wild seed collected by Miss Alice Eastwood in San Mateo County. Since all the cultures, from both sources, have been reasonably uniform, there is no reason to doubt that the species is a relatively stable type with a geographic range of considerable extent. The species has received its name from the fact that the material thus far seen has come from central California, the area covered by Greene's Flora Franciscana.

The name *Oenothera venusta* is proposed for a species from the more southern part of California. Two varieties of it have been cultivated, differing from each other by the absence in one of a hair type which occurs in the other. It is obviously impossible to affirm that either variety is the parent form from which the other has been derived. In this case, however, and whenever a similar situation arises in the future, the writer will proceed on the hypothesis that the variety in which a character is absent is the derivative form, and the specific diagnosis will be drawn up to cover only the hypothetically older form. The varietal descriptions need then cover contrasting characters only. If a true specific diagnosis were drawn up to include all the varieties of the species, it would become necessary to define and name separately the "var. *typica*" of each species. Such a course would be logical, but in the present unsettled state of our knowledge of the relationships of the Oenotheras it seems undesirable to introduce any names which can be dispensed with. Consequently the diagnosis of the *Oe. venusta*

has been drawn up to cover only one variety; the other is described as *Oe. venusta* var. *grisea*.

The typical form of *Oe. venusta* was grown from seeds collected by S. B. Parish at San Bernardino, California, Sept. 16, 1912. Var. *grisea* was collected by F. M. Reed (No. 358) at Riverside, Cal. The writer's cultures of 30 plants of each were very uniform, and the forms are described after only one generation of cultivation. Cultures of both were also grown during the past summer by Prof. B. M. Davis, at Philadelphia.

Oenothera franciscana sp. nov. Biennis. Rosula matura 4–5 dm. diametro, foliis anguste oblanceolatis, maximis modice bullatis, ca. 25 cm. longis, 3.5–4 cm. latis, utrinque molliter pilis subappressis arcuatis tectis, apice acutis, basi in petiolum attenuatis, margine infra medianam distanter sinuato-dentatis, apicem versus solum denticulatis, denticulis callosis. Planta matura 5–8 dm. alta, deorsum cum ramis 10–15 caule proprio fere aequilongis ex foliorum axillis rosulae prodeuntibus, sursum vel simplex et usque ad inflorescentiae basin solum ramulos brevis rosulatos ferens vel infra inflorescentiam ramosa. Rami infimi saepe ramosi. Caules teretes virides pilis triformibus vestiti; I, pilis 2–3 mm. longis patentibus verrucosis acutis basi rubrotuberculatis; II, aliis similibus sed multo brevioribus absque tuberculis rubris; III, paucissimis laevibus minutis ampulliformibus. Folia lanceolata, majora ca. 15 cm. longa, 3.3 cm. lata, utrinque molliter cum pilis acutis verrucosis pubescentia, brevipetiolata, apice acuta, margine distanter sinuato-denticulata. Inflorescentiae simplices laxae. Bracteae persistentes, inferiores foliis valde similes late divergentes vel deflexae, fructibus ascendentibus fere ter longiores; superiores basi obtusae vel rotundatae fructibus vix longiores, extus pilis aliis clavatis laevibus apice rotundatis viscidis, aliis longioribus acutis eis foliorum similibus sed non verrucosis tectae, intus solum his induitae. Hypanthium ca. 45 mm. longum, basi 2.3 mm. crassum, superne modice dilatatum, pilis patentibus longis acutis sublaevibus vel inconspicue verrucosis cum aliis multo brevioribus laevibus clavatis intermixtis tectum. Calycis segmenta 38 mm. longa valde hirsuta, apicibus liberis 3.5 mm. longis terminalibus inter se appressis, ante explicationem gemmam basi 7–8 mm. diametro rubrotinctam formantia; pilis biformibus, I, multis clavatis laevibus et II, longioribus patentibus acutis laevibus basi rubrotuberculatis. Petala, ca. 36 mm. longa obcordata. Stigmata patentia stamina longe excedentia. Ovarium 11 mm. longum, dense pilosum, pilis aliis ascendentibus longitudine valde variantibus acutis verrucosis, aliis paucissimis minutissimis clavatis. Fructus matus saepe 4.4 cm. longus sed plerumque multo brevior, quadrangulus prismaticus, 5–5.5 mm. crassus, apicibus valvulorum liberis (capsula dehisceta) erectis, 2.5 mm. longis truncatis. Semina 1–1.5 mm. longa, atrobrunea.—Seed

collected at Carmel Beach, Carmel-by-the-Sea, Monterey Co., California, Chas. *Piper Smith*, No. 1063.

Oenothera venusta sp. nov. Biennis. Rosula matura ca. 60 cm. diametro. Folia maxima 30 cm. longa, 6 cm. lata, modice infra medianam bullata, acuta, sinuato-denticulata, ad basin versus repando-dentata. Planta matura 13–15 dm. alta, basi ramis ca. 10 ex rosulae axillis prodeuntibus caule proprio aliquantum inferioribus, infra medianam ramulis brevibus 2–20 cm. longis haud floriferis nec rosulatis praedita; sursum ramos floriferos in spicas laterales inflorescentiae terminalis transgredientes gerens. Caulis teres pallidus purpurascens pilis paucis longis arcuatibus basi rubrotuberculatis et aliis longitudine multo variantibus plerumque brevissimis sine tuberculo rubro tectus, omnibus valde verrucosis ad apicem versus angustatis sed apice obtusiusculis. Folia lanceolata vel fere obcuneata ca. 15 cm. longa, prope basin 2 cm. lata, superne gradatim angustata acuminata, vix undulato-denticulata, utrinque velutina et de pubescentiae causa pallide viridia, pilis uniformibus, pluribus brevibus arcuatibus acutis inconspicue verrucosis. Inflorescentiae e spica terminali angusta laxa et spicis terminali similibus lateralibus constantes, ante anthesin strobiliformes, aetate bracteis ascendentibus, fructibus fere ad rhachin appressis. Bracteae persistentes, inferiores foliis parvioribus omnino similes, superiores sublineares vel subulatae acuminatae ovarii bis terve longiores, extus pilis clavatis laevibus apice rotundatis viscidis aliisque paucissimis longis acutis, intus solum pilis acutis laevibus non viscidis teetae. Hypanthium 40 mm. longum, basi 2.5 mm. crassum, apicem versus ad crassitudinem 3 mm. dilatum, pubescens ex pilis paucis longis curvatis ascendentibus et multis erectis clavatis viscidis constante. Calycis segmenta pallido-viridia, nondum expansa gemmam conicam subquadrangulam 36 mm. longam, basi 8 mm. crassam, cum apicibus liberis 4 mm. longis inter se appressis formantia, pilis biforribus eis hypanthii omnino similibus sed densioribus vestita. Petala obcordata ca. 42 mm. longa. Pistillum staminibus longius. Ovarium 10–11 mm. longum dense pilosa, pilis ascendentibus acutis verrucosis paucis longissimis multis brevissimis, nullis rubrotuberculatis. Fructus matus conicus, subteres, 4-sulcatus, prope basin 7 mm. crassus, ca. 35 mm. longus, apicibus valvulorum liberis 1 mm. longis, truncatis vel obscure emarginatis. Semina 1.5 mm. longa, brunea.—Seed collected Sept. 16, 1912, by S. B. Parish, at San Bernardino, California.

Oe. venusta var. **grisea** var. nov. a forma typica differt bracteis hypanthio et calycis segmentis griseo-viridibus solum pilis acutis verrucosis tectis. Pili clavati apice rotundati viscidii in tota planta desunt.—Seed collected at Riverside, California. “Plant 358 from F. M. Reed.” (B. M. Davis in lit.)

The interesting character which distinguishes *Oe. venusta* from its var. *grisea*,—the absence of viscid hairs in the latter, is possibly

Mendelian. Early in the morning the unopened flower buds of the two varieties look very unlike. The material (it seems to be a mixture of a sugar and a weak acid) which is excreted by the thin-walled clavate hairs of the typical form will have deliquesced, and each hair of this type is then tipped by a drop of viscid solution, sufficiently concentrated so that it has a decided taste. In this condition the buds are greener than when dry. The buds of var. *grisea*, on the contrary, have no secreting hairs and remain dry and gray. When wet by the dew, the droplets condensed on the pubescence have no taste. On a dry day the gross appearance of the buds of the two varieties is the same but they can be readily distinguished with a hand lens. In general, the viscid character of many Oenotheras (*Oe. Lamarckiana*, for example) is due to secretions from the thin-walled clavate hairs of the pubescence. The red (or green) tubercles at the base of some of the sharp thick-walled granulose hairs seem to have no secretory function.

The photographs of *Oe. venusta* var. *grisea* accompanying this article were taken under the writer's supervision in the garden of the Bureau of Plant Industry at Glenn Dale, Md., season of 1913. *Oe. franciscana* is being used for genetic studies and plants of the type strain will eventually be illustrated in that connection.

BUREAU OF PLANT INDUSTRY, Washington, D. C.

EXPLANATION OF PLATES.

Plate 107. *Oe. venusta* var. *grisea*, (above) mature rosette, (below) flowering plant.

Plate 108. *Oe. venusta* var. *grisea*, inflorescence and details.

In each figure the reduction may be calculated from the label, which is 10 cm. long.

SIX WEEKS' BOTANIZING IN VERMONT.—III.

NOTES ON THE PLANTS OF SWANTON AND VICINITY.

SIDNEY F. BLAKE.

The town of Swanton, where I collected from 16 to 30 August 1911, lies on the eastern shore of Lake Champlain about four miles below the Canadian border. Its extensive deposits of glacial sands and gravels of varying depth overlie a base of hard blue clay, and are cut here and there by masses of marble forming small hills. With the exception of a few rarities, the plants found here were much the same as those of the sandy plains about Essex Junction. In the following list of the more interesting species collected the asterisk marks those not previously recorded from the state. Altitudes are given in feet.

OSMUNDA CINNAMOMEA L. f. *INCISA* (Huntington) Gilbert. Damp woods, Swanton, 25 August.

O. CINNAMOMEA L. f. *LATIPINNULA* Blake. Edge of woods, alt. 120, Swanton, 20 August.

**O. REGALIS* L. f. *INTERRUPTA* Milde, Monog. Osmund. 61 (1868). *O. regalis* var. *interrupta* Milde, Die Höher. Sporenpl. 78 (1865).—Dampish ground, not long mowed, Swanton, 27 August (Blake 3177 part).—Fertile fronds fruiting in the middle, several terminal pairs of pinnae sterile and herbaceous, their pinnules often cut or lobed. Apparently always the result of mowing. Seen also from NEW HAMPSHIRE: Hampton Falls, 1899, A. A. Eaton; MASSACHUSETTS: Carlisle, 1882, Dame; Cambridge, 1862, Gray; Mansfield, 1907, A. A. Eaton & C. W. Welch; Stoughton, 1908, 1911, Blake.

LA TRISTACHYUM Pursh. Sandy woods, alt. 570, Fairfield.

THUJA OCCIDENTALIS L. Observed on one occasion on plains of pure sand, an unusual habitat, in company with *Betula populifolia*, *Myrica asplenifolia*, and other plants normally of this habitat.

SPARGANIUM AMERICANUM Nutt. Near shore of Fairfield Pond, Fairfield, alt. 550; the branched form.

S. DIVERSIFOLIUM Graebn. Muddy shore of Missisquoi River, Swanton; damp ground, alt. 135, Swanton.

SAGITTARIA ARIFOLIA Nutt. Sand flats, St. Albans Bay.

S. HETEROPHYLLA Pursh f. *FLUITANS* (Engelm.) Blake. Shore of Maquam Bay.

CYPERUS DENTATUS Torr. Shore of Maquam Bay.

C. DIANDRUS Torr. Bank of brook, alt. 115, Swanton, 21 August (Blake 2995).

C. STRIGOSUS L. f. *CAPITATUS* (Boeckl.) Blake. Dry sand, Swanton.

C. STRIGOSUS L. var. *COMPOSITUS* Britton. Shore of Maquam Bay, Swanton (Blake 2773, 2918).

SCIRPUS AMERICANUS Pers. Specimens taken on shore of Maquam Bay (Blake 3184) have a second divergent bracteal leaf 2.5 cm. long in addition to the normal upright one.

S. ATROVIRENS Muhl. f. *SYCHNOCEPHALUS* (Cowles) Blake. Clayey bank of Missisquoi River, Swanton; damp pasture, alt. 615, Prospect Hill, St. Albans; damp soil near brook, alt. 300, Swanton.

S. CYPERINUS var. *PELIUS* f. *CONDENSATUS* (Fernald) Blake. Common.

ERIOCAULON SEPTANGULARE With. Shore of Maquam Bay; shore of Fairfield Pond, alt. 550, Fairfield.

J. EFFUSUS L. var. *SOLUTUS* Fernald & Wiegand. Meadow, alt. 120, Swanton.

LILIMUM TIGRINUM Ker. Along Central Vermont Railroad, St. Albans, 22 August.

BETULA ALBA L. var. *MINOR* (Tuckerm.) Fernald. A single tree, about eight feet high, found uprooted along the shore of Fairfield Pond, Fairfield, alt. 550, on 24 August (Blake 3105). The summit of Mt. Mansfield is the only other known locality in the state for this strongly marked variety.

P. AMPHIBIUM L. f. *TERRESTRE* (Leers) Blake. Damp woods near Charcoal Creek, Swanton; shore of Fairfield Pond, Fairfield.

RUMEX MEXICANUS Meisn. Central Vermont Railroad yard, St. Albans.

* *ATRIPLEX PATULA* L. var. *HASTATA* (L.) Gray. Railroad yards, St. Albans, 19 August (Blake 2966). New to the state, but clearly introduced.

* *A. PATULA* L. var. *LITTORALIS* (L.) Gray. Beach of Maquam Bay, L. Champlain, 18 August (Blake 2933). A plant of coastal and Great Lake range with us, now proving to occur also in the Champlain Valley like *Ammophila arenaria*, *Lathyrus maritimus*, and *Artemisia caudata*.

SALSOLA KALI L. var. *TENUIFOLIA* G. F. W. Mey. Three tiny plants, along Central Vermont Railroad, Swanton.

* *OXYBAPHUS FLORIBUNDUS* Chois. Along Central Vermont Railroad, Swanton, 18 August (*Blake* 2859). Determined by Mr. C. A. Weatherby.

* *ERUCASTRUM POLLICHII* Schimp. & Spenn. Two plants collected, Central Vermont Railroad yard, St. Albans, 22 August (*Blake* 3008). Second New England record; see Robinson, *RHODORA* xiii. 10 (1911).

POTENTILLA ANSERINA L. Along Central Vermont Railroad, alt. 395, St. Albans.

P. ANSERINA L. var. *SERICEA* Hayne. Shore of Maquam Bay.

P. MONSPELIENSIS L. var. *NORVEGICA* (L.) Rydb. Pasture, alt. 600, Fairfield.

* *ROSA SPINOSISSIMA* L. Pasture, alt. 675, Aldis Hill, St. Albans, 19 August (*Blake* 2938). Apparently new to the state.

* *SPIRAEA SALICIFOLIA* L. Forming thickets by roadside, alt. 260, Swanton, 24 August (*Blake* 3044). New to New England.

* *EUPHORBIA GLYPTOSPERMA* Engelm. Sand along Central Vermont Railroad, Swanton, 25 August (*Blake* 3158). New to the state, but perhaps introduced.

HIBISCUS TRIONUM L. A single plant, edge of lawn, St. Albans.

H. BOREALE (Britton) Bicknell. Shore of Maquam Bay; meadow along Charcoal Creek, Swanton; near shore of Fairfield Pond; meadowy ground, Swanton.

MYRIOPHYLLUM TENELLUM Big. Shore of Maquam Bay.

CICUTA BULBIFERA L. Plants collected near shore of Fairfield Pond were freely bulbiferous and sparingly fruiting.

GERARDIA PAUPERCULA (Gray) Britton. Gravelly beach, Maquam Bay; dampish sandy soil, Swanton, 25 August; meadowy ground, Swanton, 27 August.

G. TENUIFOLIA Vahl. Clayey bank of Missisquoi River, Swanton, alt. 125.

LINARIA MINOR (L.) Desf. Along Central Vermont Railroad, Swanton, 18 August (2860). It has been recorded from North Sheldon, only a few miles away (*RHODORA* xiv. 204 (1912)).

LONICERA TATARICA L. Pasture, Aldis Hill, St. Albans.

AMBROSIA TRIFIDA L. var. *INTEGRIFOLIA* (Muhl.) T. & G. Central Vermont Railroad yard, St. Albans.

* *BIDENS DISCOIDEA* (T. & G.) Britton. Shore, Maquam Bay, Swanton, 20 August (*Blake* 2985). A species hitherto known as of coastal plain range from eastern Massachusetts southward and westward, whose occurrence in the Champlain Valley is of much interest.

* PRENANTHES RACEMOSA Mx. One or two plants along Central Vermont Railroad, Swanton, 25 August (*Blake* 3156). Perhaps introduced.

STOUGHTON, MASSACHUSETTS.

PLURALITY OF SEEDS IN ACORNS OF QUERCUS PRINUS.

CHARLES PIPER SMITH.

A LITTLE more than a year ago my colleague, Mr. B. W. Anspon, brought me an interesting acorn of the chestnut oak, *Quercus Prinus* L. Two hypocotyls were protruding from the apical end of this nut and dissection brought to light two perfect seeds. Mr. Anspon had been attracted by the large size of the acorns and was much surprised to find many of them with two sprouts in evidence. As he had never seen or heard of two-seeded acorns, he brought the matter to my attention.

My interest was aroused at once, both because of the size and weight of the nuts, and because my attention had been called, but a few days before, to a two-seeded acorn of *Q. alba* L. discovered by one of my students.

Following directions furnished by Mr. Anspon, I soon visited the locality of the chestnut oaks, two miles east of College Park, and found, presumably, the very trees from which came his specimens. I proceeded to collect all the two-seeded acorns I could find under the two trees and the final count gave the number of fifty-four. Several one-seeded nuts, almost as large as the two-seeded ones, were also collected, and four three-seeded ones added more interest to the case. Almost all the acorns had germinated at this date, Nov. 17th., the few unsprouted specimens found being evidently defective and incapable of germination. Many of the sprouting acorns were lying uncovered on the surface of the ground, though few thus exposed had the radicle penetrating the soil.



Fig. 1 A 3-seeded acorn with 3 hypocotyls emerging at apex.

One oak of another group of several trees furnished just two two-seeded specimens, the nuts of all these trees being more nearly average in size for the species and normal in other respects.

Two more two-seeded nuts were obtained, upon subsequent search,

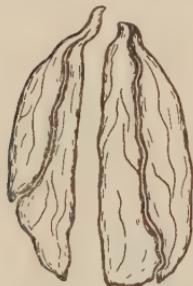


Fig. 2. Two embryos from a 2-seeded nut.

under the white oak from which came the one two-seeded acorn of that species mentioned above. Three out of over two-thousand nuts would evidently not attract attention except by pure accident; but with a possible 10% two-seeded, as in the case of the two chestnut oaks under our observation, one could not fail to notice some of the abnormal nuts upon giving any attention to the fallen crop.

In accordance with resolutions made last year, I again visited these same oak trees this November. I found, however, the acorn crop to have

been very small this season, with apparently no abnormal fruits amongst the few acorns on the ground. In size, this year's nuts are much smaller than those of 1912. The only two-seeded acorns I have noticed this season have been three from another white oak on the Maryland Agricultural College campus, and one from a very small-fruited chestnut oak west of Beltsville, Maryland.

The commonly accepted characterization of the fruit of the beech family as a one-seeded nut may justify one in taking interest in the finding of so many two-seeded, and even a few three-seeded, acorns. I am prone to believe, however, that this abnormality is much more common with us than our records would indicate. In American literature I find but one reference in this connection, Mrs. E. G. Britton some time since, in the Bulletin of the Torrey Botanical Club, describing and illustrating a single white oak acorn in which were extra cotyledons and two radicles. European writers, however, deserve credit for making record of not a few cases of teratological fruits of *Quercus*, Penzig, in his "Pflanzenteratologie," quoting Stenzel as the recorder of many two- and three-seeded acorns of *Q. Robur* L., and



Fig. 3. A 2-seeded nut; sprouts on opposite sides, not at apex.

Masters, in his "Vegetable Teratology," supplying quite a paragraph upon the subject of "Plurality of embryos in *Quercus*."

Since the normal number of ovules in the oak ovary is six, it is not so very wonderful that more than one of these should occasionally be fertilized and mature into seeds, perfect in all their parts, though abnormal in shape. It does seem odd, however, that such a large number of these abnormal fruits should be produced by one or two trees at one time.

MARYLAND AGRICULTURAL COLLEGE, College Park, Maryland.

THE NORTH AMERICAN REPRESENTATIVE OF ARENARIA CILIATA.

M. L. FERNALD.

ARENARIA *cylindrocarpa*, n. sp., perennis dense vel laxe caespitosa, ramis filiformibus humifusis, ramulis adscendentibus 1–15 cm. altis puberulis remote foliatis 1–4-floris; foliis imbricatis vel remotis lanceolatis vel oblanceolatis vel oblongis subacute glabris carnulosis siccis obsolete uninerviis 2–10 mm. longis, axilis haud vel rare fasciculigeris; pedicellis puberulis 2–30 mm. longis; calyce cylindrico basi rotundato 3–5 mm. longo fructifero 2–2.5 mm. diametro, sepalis oblongis obtusis vel subacute enerviis vel obsolete uninerviis ad capsulam arcte adpressis; petalis anguste oblongis 5–7-nerviis calycem vix aequantibus; antheris carneis; capsulis cylindricis calycem longioribus 4.5–5.5 mm. longis olivaceis vel brunneis; seminibus reniformibus 0.6–0.7 mm. longis brunneis nitidis obsolete rugulosis.

Perennial, densely or loosely caespitose; branches filiform, forming close creeping mats; branchlets ascending, 1–15 cm. high, puberulent, remotely leafy, 1–4-flowered: leaves imbricated or remote, lanceolate, oblanceolate or oblong, subacute, glabrous, thickish, when dry obscurely 1-nerved, 2–10 mm. long; the axils rarely if ever bearing small fascicles: pedicels puberulent, 2–30 mm. long: calyx cylindric, rounded at base, 3–5 mm. long, in fruit 2–2.5 mm. in diameter; sepals oblong, obtuse or subacute, nerveless or obscurely 1-nerved, closely appressed to the capsule: petals narrowly oblong, 5–7-nerved, barely equaling the calyx: anthers flesh-colored: capsules cylindric, exceeding the calyx, 4.5–5.5 mm. long, olive or brown: seeds reniform, 0.6–0.7 mm. long, brown, shining, obscurely rugulose.—*A. ciliata*, var. *humifusa* Robinson, Proc. Am. Acad. xxix. 292 (1894) and in Gray, Syn. Fl. i.

pt. 1, 240 (1895), not (Wahlenb.) Hartm. Skand. Fl. ed. 4, 141 (1843). *A. ciliata* Britton in Britton & Brown, Ill. Fl. ii. 31, fig. 1500 (1897), not L. Sp. Pl. 425 (1753).—On serpentine, rarely limestone, and possibly other rocks, Labrador, Newfoundland, Quebec and British Columbia. LABRADOR: Ramah, August 20–24, 1897, *J. D. Sornborger*, no. 126; near Hebron, *Mentzel*. NEWFOUNDLAND: serpentine tablelands, altitude about 380 m., Bonne Bay, August 27, 1910, *Fernald & Wiegand*, no. 3354; serpentine and magnesian limestone barrens, northeastern bases and slopes of Blomidon ("Blow-me-down") Mountains, July 24, 1910, August 20, 1910, *Fernald & Wiegand*, nos. 3352, 3352a; "field," Serpentine (or Coal) River, July 16, 1896, *Waghorne*; dry limestone barrens, upper slopes and tablelands, altitude 200–300 m., Table Mountain, Port à Port Bay, August 16, 1910, *Fernald & Wiegand*, no. 3353. QUEBEC: crevices and talus of serpentine, altitude 700–1100 m., Mt. Albert, Gaspé County, July 26 and August 1 and 2, 1881, *J. A. Allen*, August 12, 1905, *Fernald & Collins*, no. 76 (TYPE in Gray Herb.), July 23 and 25, 1906, *Fernald & Collins*, nos. 448, 449, 453. BRITISH COLUMBIA: boggy slopes, Silver City, August 11, 1885, *J. Macoun*; "summit of Rocky Mountains," August 14, 1890, *J. Macoun*.

Confused by American botanists with *Arenaria norvegica* Gunn. Fl. Norv. ii. 144, no. MC, t. 9, figs. 7–9 (1772) = *A. ciliata*, var. *norvegica* Hartm. Skand. Fl. ed. 3, 105 (1838) = *A. ciliata*, var. *humifusa* Hartm. l. c. ed. 4, 141 (1843); also with *A. ciliata* L. Sp. Pl. 425 (1753); but differing from each of those European plants in many characters. In both *A. norvegica* and *A. ciliata* the leaves are more obviously nerved and even those of the flowering branches usually subtend small axillary fascicles, and in *A. ciliata* the leaves are strongly ciliate. In both *A. norvegica* and *A. ciliata* the calyx is campanulate to hemispherical, in fruit 3–4 mm. in diameter; and the sepals are oval, acuminate, and usually strongly nerved, those of *A. ciliata* often ciliate at base. In both the European species the petals are oval and distinctly longer than the sepals; and both have ebony-black seeds, those of *A. norvegica* coarsely rugose, of *A. ciliata* distinctly but more finely rugose.

GRAY HERBARIUM.

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